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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/932,567	08/17/2001	Chidambar Ganesh	79740	5003

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EXAMINER	
BELL, MELTIN	
ART UNIT	**PAPER NUMBER**
2121	2

DATE MAILED: 02/11/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/932,567	GANESH, CHIDAMBAR	
	Examiner	Art Unit	
	Meltin Bell	2121	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 August 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *17 August 2001* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

This action is responsive to application **09/932,567** filed **08/17/01**.

Claims 1-18 have been examined.

Priority

Applicant has not complied with one or more conditions for receiving the benefit of an earlier filing date under 35 U.S.C. 120 as follows:

> This application is claiming the benefit of a prior filed nonprovisional application under 35 U.S.C. 120, 121, or 365(c). Copendency between the current application and the prior application (#09/246,208 filed 1/20/99 USPN 6,282,526 issued 8/28/01) is required.

Information Disclosure Statement

Applicant is respectfully reminded of the ongoing Duty to disclose 37 C.F.R. 1.56 all pertinent information and material pertaining to the patentability of applicant's claimed invention, by submitting in a timely manner PTO-1449, Information Disclosure Statement (IDS) with the filing of applicant's application or thereafter.

The following documents identified in the specification would be appropriately disclosed in an IDS:

- U.S. Patent Numbers
    - 5,926,802 - page 9, line 5

- 5,809,486 - page 9, line 13
- 5,710,867 - page 10, line 3
- 5,677,996 - page 10, line 17
- 5,579,439 - page 11, line 11
- 5,524,179 - page 12, line 10

- Naval Undersea Warfare Center Division Newport, Newport RI, NUWC-NPT Technical Report 10,876 1/20/98 "Fuzzy Logic-Based Inferencing in the Presence of Input Data Uncertainty" by Chidambar Ganesh on page 13, lines 14-18.

Drawings

The United States Patent and Trademark Office of Draftsperson's Patent Drawings Review have reviewed the formal drawings. The drawings have not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is required in correcting any errors of which applicant may become aware in the drawings.

The drawings are objected to because:

- The terminating point indicating line 51 in Fig. 3 should be located farther away from line 51's intersection with line 61.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

The specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is required in correcting any errors of which applicant may become aware in the specification.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 1, 7 and 13 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

As a system, claim 1 is not in the technological arts because it can be realized on paper with pen or pencil, in a printed manual, etc.

As methods, claims 7 and 13 offer abstract ideas (e.g. "information", "physical phenomena", "possible values", "rules") that are also not applied in the technological arts. Abstract ideas and their manipulation constitute "descriptive material" that is not patentable, *Warmerdam*, 33 F.3d at 1360, 31 USPQ2d at 1759 and *Schrader*, 22 F.3d at 292-93, 30 USPQ2d at 1457-58, respectively. If the abstract ideas of claims 1, 7 and 13 represented functional descriptive material consisting of data structures and computer programs which impart functionality when run on a computer (recorded on some computer readable medium), they become structurally and functionally

interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized. For examples,

- *In re Lowry*, 32 F.3d 1579, 1583-84, 32 USPQ2d 1031, 1035 (Fed. Cir. 1994) offers claim to data structure stored on a computer readable medium that increases computer efficiency held statutory and
- *Warmerdam*, 33 F.3d at 1360-61, 31 USPQ2d at 1759 offers product-by-process claim to computer having a specific data structure stored in memory also held statutory while
- *Warmerdam*, 33 F.3d at 1361, 31 USPQ2d at 1760 offers claim to a data structure *per se* held nonstatutory.

Because the inventions are not claimed to be practiced on a computer and/or stored on a computer readable medium, they are not limited to practical applications in the technological arts. Specifically, the claims are systems and methods without any particular practical application, such as a program running on a computer and stored in a computer readable medium or memory. On that basis alone, those claims are clearly nonstatutory.

Claim Rejections - 35 USC § 102

To expedite a complete examination of the instant application, the claims rejected under 35 U.S.C. 101 (nonstatutory) above are further rejected as set forth below in anticipation of applicant amending these claims to place them within the four statutory categories of invention.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3, 6-9, 12-13, 15-16 and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by *Giacalone et al* U.S. Patent Number 5,710,867 (January 20, 1998).

Regarding claim 1:

Giacalone et al teaches,

- a rule decomposer comprising a plurality of rules, each of said rules being utilized for producing an output in response to said plurality of inputs to thereby produce a plurality of rule decomposer outputs (Fig. 3; Abstract, "A method and system...overall truth values")

- a union operator for determining a conjunction of said plurality of rule decomposer outputs to produce a fuzzy inference output (column 7, lines 17-47, "The maximizer block...the union block 19)

Regarding claim 2:

Giacalone et al further teaches,

- said each of said plurality of rules has an IF-THEN format (column 4, lines 41-43, "The inference rules...one consequent")

Regarding claim 3:

Giacalone et al further teaches,

- said fuzzy inference output of said fuzzy inference system being applied as an input to a control system (column 3, lines 22-36, "A third known...feedback output variables")

Regarding claim 6:

Giacalone et al further teaches,

- said union operator is described mathematically by an equation of the form:

$$M_{\mu a}(y)=\bigcup_{i=1}^{M}\mu_i(y)$$

(column 5, lines 52-63, "In the graphs...the universe U")

Regarding claim 7:

Giacalone et al further teaches,

- providing a plurality of fuzzy inference rules (column 7, lines 7-45, "The input 25...inference rule R")

- producing a plurality of rule outputs in response to said uncertain input data (Fig. 3)

- inferring a fuzzy inference by determining a conjunction of said plurality of rule outputs (column 4, lines 54-62, "Another aspect of...logic inference rule")

Regarding claim 8:

The rejection of claim 7 is incorporated. Therefore, claim 8 is rejected under the same rationale as claim 7.

Regarding claim 9:

Giacalone et al further teaches,

- precalculating said plurality of rule outputs (column 5, lines 64-67, "The operation for...are the following:"; column 6, lines 1-20, "(1) the weight ... type or defuzzified")

Regarding claim 12:

Giacalone et al further teaches,

- said conjunction is determined mathematically by utilizing an equation of the form:

$$M_{\mu a}(y)=\bigcup_{I=1}^{M}\mu_I(y)$$

(column 5, lines 52-63, "In the graphs...the universe U")

Regarding claim 13:

Giacalone et al further teaches,

- producing a plurality of one dimensional solutions in response to said uncertain input data (Fig. 3, items 44, 58)

- inferring a fuzzy inference output by determining a conjunction of said one--dimensional solutions (column 4, lines 54-62, "Another aspect of...logic inference rule")

Regarding claim 15:

The rejection of claim 13 is incorporated. Therefore, claim 15 is rejected under the same rationale as claim 13.

Regarding claim 16:

The rejection of claim 13 is incorporated. Therefore, claim 16 is rejected under the same rationale as claim 13.

Regarding claim 18:

Giacalone et al further teaches,

- said step of determining a conjunction of said one dimensional solutions is described by a mathematical equation of the form:

$$M_{\mu a}(y)=\bigcup_{I=1}^{M}\mu_I(y)$$

(column 5, lines 52-63, "In the graphs...the universe U")

Claim Rejections - 35 USC § 103

To expedite a complete examination of the instant application, the claims rejected under 35 U.S.C. 101 (nonstatutory) above are further rejected as set forth below in anticipation of applicant amending these claims to place them within the four statutory categories of invention.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 4-5, 10-11, 14 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Giacalone et al* U.S. Patent Number 5,710,867 (January 20, 1998) in view of *Bessacini et al* U.S. Patent Number 5,671,138 (September 23, 1997) in further

view of *Kunemund et al* U.S. Patent Number 5,704,010 (December 30, 1997) and in further view of *Singh et al* "Fuzzy Logic Applications to Multisensor-Multitarget Correlation" (July 1997).

Regarding claim 4:

The rejection of claim 3 is incorporated based on *Giacalone et al's* following teachings:

- a rule decomposer comprising a plurality of rules, each of said rules being utilized for producing an output in response to said plurality of inputs to thereby produce a plurality of rule decomposer outputs (Fig. 3; Abstract, "A method and system...overall truth values")

- a union operator for determining a conjunction of said plurality of rule decomposer outputs to produce a fuzzy inference output (column 7, lines 17-47, "The maximizer block...the union block 19)

- said fuzzy inference output of said fuzzy inference system being applied as an input to a control system (column 3, lines 22-36, "A third known...feedback output variables")

However, *Giacalone et al* doesn't explicitly teach intercept guidance control systems while *Bessacini et al* teaches,

- said fuzzy inference output being applied to said intercept guidance control system to improve performance in presence of the physical phenomena (Abstract, "A target intercept...the second site")

Motivation – The portions of the claimed system would have been a highly desirable feature in this art for

- Ideal processing of several rules (*Giacalone et al*, column 4, lines 6-35, "if all the...of repeatable structures")
- Improved target intercept when the undersea self-guided missile and target move independently (*Bessacini et al*, column 4, lines 42-50, "it is an...undergo independent motion")

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to combine *Giacalone et al* with *Bessacini et al* to obtain the invention specified in claim 4, a fuzzy inference system. The modification would have been obvious because one of ordinary skill in the art would have been motivated to optimally evaluate rules for multiple moving objects.

Regarding claim 5:

The rejection of claim 1 is incorporated based on *Giacalone et al's* following teachings:

- a rule decomposer comprising a plurality of rules, each of said rules being utilized for producing an output in response to said plurality of inputs to thereby produce a plurality of rule decomposer outputs (Fig. 3; Abstract, "A method and system...overall truth values")

- a union operator for determining a conjunction of said plurality of rule decomposer outputs to produce a fuzzy inference output (column 7, lines 17-47, "The maximizer block...the union block 19)

However, *Giacalone et al* doesn't explicitly teach RAM storage while *Kunemund et al* teaches,

- a dynamic RAM storage utilized for storing precomputed rule decomposer outputs (column 7, lines 5-37, "The output from...the read/write memory")

Motivation – The portions of the claimed system would have been a highly desirable feature in this art for

- Ideal processing of several rules (*Giacalone et al*, column 4, lines 6-35, "if all the...of repeatable structures")
- Optimizing chip area (*Kunemund et al*, column 4, lines 42-50, "it is an...undergo independent motion")

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to combine *Giacalone et al* with *Kunemund et al* to obtain the invention specified in claim 5, a fuzzy inference system. The modification would have been obvious because one of ordinary skill in the art would have been motivated to optimize rule evaluation in space and time.

Regarding claim 10:

The rejection of claim 9 is incorporated based on *Giacalone et al's* following teachings:

- providing a plurality of fuzzy inference rules (column 7, lines 7-45, "The input 25...inference rule R")

- producing a plurality of rule outputs in response to said uncertain input data (Fig. 3)

- inferring a fuzzy inference by determining a conjunction of said plurality of rule outputs (column 4, lines 54-62, "Another aspect of...logic inference rule")

- precalculating said plurality of rule outputs (column 5, lines 64-67, "The operation for...are the following:"; column 6, lines 1-20, "(1) the weight ... type or defuzzified")

However, *Giacalone et al* doesn't explicitly teach Ram memory while *Kunemund et al* teaches,

- storing a result of said step of precalculating in RAM memory (column 7, lines 5-37, "The output from...the read/write memory")

Motivation – The portions of the claimed method would have been a highly desirable feature in this art for

- Ideal processing of several rules (*Giacalone et al*, column 4, lines 6-35, "if all the...of repeatable structures")
- Optimizing chip area (*Kunemund et al*, column 4, lines 42-50, "it is an...undergo independent motion")

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to combine *Giacalone et al* with *Kunemund et al* to obtain the invention specified in claim 10, a fuzzy logic method. The modification would have been obvious because one of ordinary skill in the art would have been motivated to optimize rule evaluation in space and time.

Regarding claim 11:

The rejection of claim 7 is incorporated based on *Giacalone et al's* following teachings:

- providing a plurality of fuzzy inference rules (column 7, lines 7-45, "The input 25...inference rule R")

- producing a plurality of rule outputs in response to said uncertain input data (Fig. 3)

- inferring a fuzzy inference by determining a conjunction of said plurality of rule outputs (column 4, lines 54-62, "Another aspect of...logic inference rule")

However, *Giacalone et al* doesn't explicitly teach producing a tactical picture while *Singh et al* teaches,

- producing a tactical picture that incorporates said output from said fuzzy inference system (page 752, Abstract, paragraph 1, "A consistent tactical...ill-defined engineering problems")

Motivation – The portions of the claimed method would have been a highly desirable feature in this art for

- Ideal processing of several rules (*Giacalone et al*, column 4, lines 6-35, "if all the...of repeatable structures")
- Successfully applying technology to complex engineering problems (*Singh et al*, page 752, section I, paragraph 3, "Fuzzy logic provides...complex engineering problems")

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to combine *Giacalone et al* with *Singh et al* to obtain the invention specified in claim 10, a fuzzy logic method. The modification would have been obvious because one of ordinary skill in the art would have been motivated to best incorporate rule evaluation in difficult problems.

Regarding claim 14:

The rejection of claim 13 is incorporated based on *Giacalone et al's* following teachings:

- producing a plurality of one dimensional solutions in response to said uncertain input data (Fig. 3, items 44, 58)

- inferring a fuzzy inference output by determining a conjunction of said one--dimensional solutions (column 4, lines 54-62, "Another aspect of...logic inference rule")

However, *Giacalone et al* doesn't explicitly teach a tactical picture display while *Singh et al* teaches,

- the step of generating from said fuzzy inference output a tactical picture display which represents uncertainty associated with the physical phenomena (page 761, left column, first paragraph, "The true target...in Table II")

Motivation – The portions of the claimed method would have been a highly desirable feature in this art for

- Ideal processing of several rules (*Giacalone et al*, column 4, lines 6-35, "if all the...of repeatable structures")
- Successfully applying technology to complex engineering problems (*Singh et al*, page 752, section I, paragraph 3, "Fuzzy logic provides...complex engineering problems")

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to combine *Giacalone et al* with *Singh et al* to obtain the invention specified in claim 14, a method for a fuzzy inference system. The modification would have been obvious because one of ordinary skill in the art would have been motivated to best incorporate rule evaluation in difficult problems.

Regarding claim 17:

The rejection of claim 14 is incorporated. Claim 17's further limitations are taught in *Singh et al*:

- the tactical picture display generated from said fuzzy inference output further depicting a range of possibilities for the military commander to choose among (page 763, left column, paragraphs 2-3, "The corresponding binary...not be associated"; page 763, right column, paragraph 1, sentence 1 through paragraph 3, sentence 1, "Fig. 26 suggests...in Fig. 18")

Therefore, claim 17 is rejected under the same rationale as claim 14.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

- *Giacalone et al;* U.S. Patent Number 5,710,867
- *Bessacini et al;* U.S. Patent Number 5,671,138
- *Kunemund et al;* U.S. Patent Number 5,704,010
- *Singh et al;* "Fuzzy Logic Applications to Multisensor-Multitarget Correlation"; IEEE Transactions on Aerospace and Electronic Systems; Vol. 33, Iss. 3; July 1997; pp 752-769
- *Hisano;* U.S. Patent Number 5,179,625; Fuzzy Inference System Having a Dominant Rule Detection Unit
- *Tsutsumi et al;* U.S. Patent Number 5,131,071; Fuzzy Inference Apparatus

- *Hisano;* European Patent Number 0 361 401 A2; Fuzzy Inference System Having a Rule Processing Means

- *Fagarasan et al;* U.S. Patent Number 5,317,319; Automatic Global Radar/IR/ESM Track Association Based on Ranked Candidate Pairings and Measures of their Proximity

- *Komai et al;* U.S. Patent Number 5,218,555; Method for Judging a Color Difference Using Rules Fuzzy Inference and Apparatus Therefore

- *Tsuda et al;* U.S. Patent Number 5,175,795; Hybridized Frame Inference and Fuzzy Reasoning System and Method

- *Sekine;* U.S. Patent Number 5,186,150; Method and System for Measuring Fluid Flow Rate by Using Fuzzy Inference

- *Togai et al*; "Expert System on a Chip"; Proceedings of the ACM SIGART international symposium on Methodologies for intelligent systems; December 1986

- *Hicks et al*; "Intelligent Agent-Based Software Architecture for Combat Performance under Overwhelming Information Inflow and Uncertainty"; Proceedings Seventh IEEE International Conference on Engineering of Complex Computer Systems; 11-13 June 2001; pp 200-210

- *Dougherty et al*; "An approximate Optimal Ballistic Intercept Guidance Law"; Proceedings of the 33rd IEEE Conference on Decision and Control; Vol. 4; 14-16 Dec. 1994; pp 3871-3876

Any inquiry concerning this communication or earlier communications from the Office should be directed to Meltin Bell whose telephone number is 703-305-0362. This Examiner can normally be reached on Mon - Fri 7:30 am - 4:30 pm.

If attempts to reach this Examiner by telephone are unsuccessful, his supervisor, Anil Khatri, can be reached on 703-305-0282. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3900.

MB

ANIL KHATRI
SUPERVISORY PATENT EXAMINER